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[SIXTH SERIES.]

“..... per litora spargite muscum,
Naiades, et circum vitreos considite fontes:
Pollice virgineo teneros hic carpite flores:
Floribus et pictum, divæ, replete canistrum.
At vos, o Nymphæ Craterides, ite sub undas;
Ite, recurvato variata corallia trunco
Vellite muscosis e rupibus, et mihi conchas
Ferte, Deæ pelagi, et pingui conchyliis succo.”
N. Parthenii Giannettasii Ecl. 1.

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I.—*Natural History Notes from H.M. Indian Marine Survey Steamer 'Investigator,' Commander C. F. Oldham, R.N.—Series II., No. 19. Report upon the Mollusca dredged in the Bay of Bengal and the Arabian Sea during the Season 1893–94. By EDGAR A. SMITH.*

[Plates I. & II.]

THIS collection contains several very remarkable new forms, among which the two species of the new genus *Pontiothauma* are worthy of special notice. The *Calliostoma*, the *Dentalium*, the two new forms of *Cryptodon* are also species of considerable interest. The occurrence of the characteristically Japanese *Ranella perca* in the Indian Ocean is remarkable, and the discovery of a British *Lucina* and an Atlantic *Poromya* in these southern latitudes is of still greater interest. Another instance of wide distribution is that of the *Solenomya patagonica*. In my former paper I also described a *Lucina* which was hardly separable from a species occurring in the Straits of Magellan.

PONTIOTHAUMA*, gen. nov.

Testa fusiformis, haud umbilicata, antice rostrata, oblique plicata, spiraliter lirata et sulcata; apertura antice breviter canaliculata; columella simplex, haud plicata: labrum tenue, postice late sed haud profunde sinuatum; operculum nullum.

Animal cæcum, rostro magno, late expanso instructum; radula nulla.

The examination of the soft parts of this remarkable mollusk has kindly been undertaken by Mr. S. Pace, and the results of his investigation will be published subsequently. From a preliminary examination he is inclined to believe that its relationship will prove to be with the Pleurotomatidæ. The enormously expanded rostrum, and the absence of eyes, radula, and operculum, at once separate this genus from any which it approaches in shell-characters. Conchologically it bears some resemblance to the plicate forms of *Sipho* (*S. fusiformis*, &c.).

Pontiothauma mirabile. (Pl. I. fig. 1.)

Testa fusiformis, turrita, alba, epidermide plus minus induta; spira elongata, acuminata; anfractus 10?, superstientes septem convexi, regulariter lente accrescentes, oblique et flexuose costati (costis supra et infra evanescentibus), spiraliter fortiter et confertim lirati, ultimus subtumidus, costis obliquis gracilioribus et minus prominentibus instructus, antice breviter rostratus; apertura elongata, antice in canalem brevem producta, longit. totius $\frac{1}{2}$ paulo minor, intus alba; columella rectiuscula; labrum haud incrassatum, prope suturam late, sed haud profunde sinuatum, in medio prominens, arcuatum.

Longit. 136 millim., diam. 52; apertura 65 longa, 27 lata.

Hab. Off the Malabar coast, lat. 10° 7' 50'' N., long. 74° 42' 30'' E., in 1250 fathoms.

When viewed from behind this remarkable shell bears a strong resemblance to an elongate specimen of the common whelk, *Buccinum undatum*. It has all the aspect of a northern form, and one can scarcely credit the fact of its living so far south as the Indian Ocean. Only a single specimen was obtained.

Pontiothauma abyssicola. (Pl. I. fig. 2.)

Testa elongata, turrita, solidiuscula, imperforata, alba, epidermide tenui pallide olivaceo-viridi induta; anfractus sex, superne exca-

* πόντιος, marine; and θαῦμα, a wonder.

vati, oblique et nodose plicati, ad latera levissime convexi, sutura obliqua sejuncti, striis spiralibus incisus numerosis, lineisque incrementi tenuibus obliquis flexuosis sculpti, ultimus mediocriter convexus, undique transversim striatus, striis circa basin latis, sulciformibus; apertura oblonga, alba, longit. totius $\frac{1}{2}$ paulo minor, inferne brevissime et latissime canaliculata, subrecurva; labrum tenue, in excavationem infra suturam leviter sinuatum, infra arcuatum; columella alba, callosa, in medio paulo arcuata, inferne oblique torta; operculum nullum.

Longit. 50 millim., diam. 24; apertura 22 longa, 10 lata.

Hab. Station 134, off Kistna, Bay of Bengal, in 753 fathoms.

The depression or concavity at the upper part of the whorls produces a marginate appearance at the suture, and upon the margination the lines of growth are slightly puckered. The spiral striæ are somewhat deep and have rather a regular look to the naked eye. The nodose plications at the angulation above do not extend far downwards, but soon become obsolete, so that the lower part of the whorls has a nearly even surface.

Like the type of the genus, this species has neither radula nor operculum. It differs, however, in possessing eyes. Until the soft parts have been more fully examined, its position in the genus *Pontiothauma* must be considered uncertain.

Pleurotoma vagata. (Pl. I. fig. 3.)

Testa fusiformis, turrata, alba, epidermide tenuissima induta, incrementi lineis flexuosis striata; spira elongata, acuminata; anfractus 12, superne excavati, in medio carina quadrata tuberculata instructi, superne infra suturam carino-marginati, undique spiraliter striati, infra medium liris spiralibus 1-2 cincti, ultimus transversim striatus et liratus, antice elongato-rostratus; apertura cum canali longit. totius $\frac{1}{2}$ haud æquans, intus alba, liris intrantibus circiter decem armata; labrum tenue, subprofunde incisum; columella rectiuscula, leviter obliqua; canalis elongatus, angustus, subrecurvus.

Longit. 65 millim., diam. 23; apertura cum canali 28 longa, in medio 7 lata.

Hab. Station 172, off Trincomalee, Ceylon, in 200-350 fathoms.

This species belongs to that group of *Pleurotoma* which includes *P. Kieneri*, Doumet, *P. carinata*, Gray, and a few others which are characterized by a tuberculated keel upon the middle of the whorls.

A single specimen only was obtained.

Pleurotoma præsignis. (Pl. I. fig. 4.)

Testa fusiformis, turrita, alba, epidermide tenui flavescente induta; anfractus 11–12?, regulariter lente crescentes, superne ad suturam fortiter carinati, in medio prominentes, serie nodularum subacutarum instructi, infra nodulas linea filiformi (in anfr. superioribus obsoleta), et supra nodulas lineis duabus gracillimis cincti, ultimus infra medium angustatus, brevirostratus, infra nodulas circiter quatuor aliisque tenuioribus circa caudam ornatus; apertura alba, cum canali longit. totius $\frac{1}{3}$ æquans; labrum tenue, ad nodulas mediocriter profunde et latissime sinuatum, infra sinum prominens, arcuate productum; columella supra medium leviter incurvata, inferne paulo obliqua; canalis brevis, subrecurvus.

Longit. 42 millim., diam. 15; apertura cum canali 16 longa, in medio $5\frac{1}{2}$ lata.

Hab. Off Colombo, Ceylon, in 675 fathoms.

The prominent row of tubercles around the middle of the whorls, the keel beneath the suture, and the broad sinus in the labrum are the principal features of this species. The apex of the spire being broken away makes it impossible to state with certainty the exact number of whorls, but they would probably amount to eleven or twelve. The entire surface exhibits fine flexuous lines of growth.

Drillia fugata. (Pl. I. figs. 5, 5 a.)

Testa elongata, turrita, alba, epidermide tenui flavo-olivacea induta, spiralter striata, oblique costulata; spira elongata, acuminata; anfractus decem, convexiusculi, superne excavati, ad suturam undulate subcarinati, infra excavationem costis obliquis (in anfr. ultimo 11–12 inferne attenuatis et evanescentibus) instructi, ultimus antice paulo attenuatus; apertura angusta, alba, longit. totius $\frac{1}{2}$ paulo minor; labrum superne ad excavationem haud profunde sinuatum; columella rectiuscula, callo tenui albo induta; canalis mediocriter latus, brevis, leviter recurvus.

Longit. 45 millim., diam. 14; apertura 20 longa, 6 lata.

Var. Testa striis latioribus transversim sculpta, interstitiis liriformibus supra costas continuis (fig. 5 a).

Hab. Station 172, off Trincomalee, in 200–350 fathoms.

The greater breadth of the spiral striæ and the more conspicuous intervening ridges give the variety a somewhat distinct appearance from the type. The character of the costæ, the depression *above* them, the thickened wavy margination beneath the suture, and the epidermis are, however, similar.

Nassa turrifera. (Pl. I. fig. 6.)

Testa elongata, turrita, albida, nitida, costata; spira acuminato-pyramidalis, turrita; anfractus octo, supremi tres (nucleus) convexi, læves, cæteri tabulati, lateribus planiusculis, costis tenuibus supra tuberculatis (in anfr. penultimo circiter 12) instructi, spiraliter striati et lirati, ultimus antice constrictus, infra medium fortius liratus, liris supra costas subtuberculatis; apertura parva; labrum extra varicosum, intus tuberculis paucis, quorum medianum maximum, munitum; columella callo, tuberculis paucis parvis instructo, induta; canalis brevis, obliquus, recurvus. Longit. 10 millim., diam. 5.

Hab. Station 162, lat. 13° 51' 12" N., long. 80° 28' 12" E., off Coromandel coast, in 145-250 fathoms.

This species is remarkable for its elongate turreted form and the smallness of the aperture. The ribs are noduled at the upper end, almost perpendicular, and the least curved. The sutural line is prettily undulating. Of the three specimens of this interesting species one is more elongate than the others; in this the aperture is about one third the total length of the shell, whereas in the shorter examples it rather exceeds that proportion.

Columbella (Mitrella) Pacei. (Pl. I. fig. 7.)

Testa breviter fusiformis, sordide albida, lævis, circa basin anfractus ultimi oblique sulcata; spira elongata, acuminata; anfractus 8, tres embryonales pellucidi, convexi, cæteri turriti, planiusculi, vel levissime convexi, sutura obliqua, profunda discreti, infra suturam stria unica marginati, ultimus infra medium constrictus, transversim striatus, circa caudam oblique sulcatus; apertura elongata, medio-criter angusta, antice canaliculata, longit. totius $\frac{1}{2}$ paulo minor; canalis brevis, recurvus, obliquus; columella supra arcuata, infra obliqua, callo tenui induta, tuberculis parvis 2-3 instructa; labrum ad marginem acutum, extra varice incrassatum, intus subtuberculatum, suturam versus leviter sinuatum. Longit. 12 millim., diam. $5\frac{1}{2}$; apertura cum canali $5\frac{1}{2}$ longa, in medio 2 lata.

Hab. Station 162, off Coromandel coast, in 145-250 fathoms.

Judging from the four specimens of this species, the spire is liable to erosion at the apex. In the perfect example the apical whorl is almost globular, and the two following are also convex; these three, forming the embryonic shell, are pellucid and pinkish beneath the suture.

I have named this interesting species after Mr. S. Pace,

who has made a special study of the Columbelloidæ, and has kindly examined it for me.

Ranella (Biplex) perca (Perry).

Hab. Station 151, off Colombo, in 142-400 fathoms.

The examples of this well-known shell in the present collection are practically identical with the ordinary Japanese form. The knowledge of the extended range of this species lends support to the statement by Reeve, that it was obtained at the Philippine Islands by Mr. Cuming. It is interesting to note that Mr. G. B. Sowerby has also recorded the occurrence of another Japanese form (*Xenophora pallidula*) from 188 fathoms off the Andaman Islands.

Natica albospira. (Pl. I. fig. 8.)

Testa parva, globosa, anguste umbilicata, pallide fuscescens, infra suturam et circa basin alba; spira brevis, parva, ad apicem minuta; anfractus $5\frac{1}{2}$, convexi, celeriter accrescentes, sutura profunda canaliculata discreti, superiores $2\frac{1}{2}$ læves, cæteri infra suturam oblique plicati, plicis inferne sensim evanidis, ultimus globosus, striis spiralibus obsolete sculptus; umbilicus parvus, callo intrante crasso semiimpletus; apertura semicircularis; columella obliqua, incrassata, labio callo tenui juncta; operculum testaceum, griseum, supra spiram olivaceo tinctum, planum, margine externo arcuato porca duplici incrassato, liris paucis inconspicuis porcæ parallelis striisque radiantibus haud conspicuis sculptum.

Diam. maj. $12\frac{1}{2}$ millim., min. 9, alt. 12; apertura $9\frac{1}{2}$ longa, $5\frac{1}{2}$ lata.

Hab. Station 172, off Trincomalee, Ceylon, in 200-350 fathoms.

Judging from the single specimen in the collection, it seems probable that this species may sometimes exceed the dimensions given above. It differs from the young of *N. rufa* in the absence of the pale peripheral zone, in the greater number of whorls, the stronger plications, smaller nucleus, and different operculum.

Natica candidula. (Pl. I. fig. 9.)

Testa parva, globosa, alba, infra suturam zona opaco-albida picta, mediocriter umbilicata; spira prominula; anfractus quatuor, convexi, læves, sed infra suturam oblique obsolete plicati; umbilicus profundus, pervius, simplex; apertura semicircularis; columella obliqua, leviter incrassata, superne callo reflexo labro juncta.

Diam. maj. 9 millim., min. 7, alt. 9; apertura 6 longa, 4 lata.

Hab. Station 151, off Colombo, in 142-400 fathoms.

A small white species, without any striking features. The spire is somewhat prominent and the umbilicus without any callus within. The single specimen was dredged dead, without the operculum. It has much the general aspect of the British *N. Montaguï*, but has no trace of an umbilical callus.

Sigaretus parvus. (Pl. I. fig. 10.)

Testa parva, depressa, obliqua, auriformis, minute perforata, tenuis, albida, epidermide flavescente plus minus induta; spira brevis, apice minuto fusco terminata; anfractus 4, convexiusculi, superiores duo spiraliter tenuissime striati, ultimus liris spiralibus filiformibus subconfertis undulatis circa medium planulatis instructus, lincis incrementi arcuatis conspicuis sculptus; apertura obliqua, ovata; peristoma tenue, marginibus conniventibus, callo tenui junctis, columellari paulo incrassato, reflexo, umbilicum minutum fere obtegente.

Diam. maj. $12\frac{1}{2}$ millim., min. 9, alt. 10; apertura $8\frac{1}{2}$ longa, $6\frac{1}{3}$ lata.

Hab. Station 170, off Coromandel coast, in 107 fathoms.

Of a different form to that of *S. tener**, also from the Bay of Bengal.

Bathybembix Wood-Masoni. (Pl. I. fig. 11.)

Testa imperforata, solida, pyramidalis, sub epidermide tenuissima, dilute fusco-grisca, alba, submargaritacea, ad peripheriam acute carinata; spira acute conica, lateribus fere rectis; anfractus 9-10?, lente accrescentes, superiores fere plani, supra suturam levissime concavi et tuberculis minutis acutis ornati, tres ultimi haud tuberculati, striis incrementi obliquis regularibus sculpti, ultimus leviter convexus, sed prope carinam paulo concavus, infra convexiusculus, striatus, circa regionem umbilici carina obtusa instructus; apertura obliqua, longit. totius $\frac{2}{3}$ subæquans; peristoma leviter incrassatum, album, levissime expansum, margine columellari fortiter reflexo, appresso, callo lato albo superne labro juncto; operculum tenue, corneum, anfractibus decem.

Diam. maj. 25 millim., min. 22, alt. 23.

Hab. Station 150, off Northern Maldive Atoll, 719 fathoms.

This is rather solid for a deep-water form, and the thickness of the calcareous layer above the nacre is sufficient to almost conceal it. However, in certain lights a slight iridescence is observable. The tubercles upon the upper whorls have the appearance of minute denticles overhanging the suture, which gradually pass away upon the penultimate whorl. In the

* Smith, Ann. & Mag. Nat. Hist. 1894, vol. xiv. p. 165, pl. iv. fig. 8.

young state this species is probably umbilicated. The basal keel is crossed by the incremental lines and has an irregular subnodose appearance. In addition to the lines of growth, indistinct spiral sulci are traceable upon the last two whorls, and one of the two specimens examined exhibits a slender elevated line revolving up the spire a little below the suture.

The general form is like that of *B. æola*, Watson, which is a much less solid form than the present species, and has a different style of sculpture.

I have associated with this remarkable species the name of the late Professor J. Wood-Mason, who has published several valuable reports upon portions of the 'Investigator' collections.

Calliostoma subleve. (Pl. I. fig. 12.)

Testa acute conica, imperforata, dilute flavo- vel roseo-fusca, infra pallida, nitida, iridescens, ad peripheriam acute carinata; spira acute conica, lateribus levissime concavis; anfractus 8, apicales 1-2 albi, subglobosi, cæteri plani, inferne ad suturam carinati, carina crenulata, spiraler obsolete substriati, lira supra carinam cincti; anfr. tertius et quartus cancellati, ultimus infra planiusculus, obsolete tenuissime concentrice striatus, circa regionem umbilici liris tribus ornatus; umbilicus callo obtectus: apertura obliqua, subquadrata, intus lævis, iridescens; columella brevis, obliqua, margaritacea.

Diam. maj. 20 millim., min. 17, alt. 18.

Hab. Station 172, off Trincomalee, Ceylon, in 200-350 fathoms.

The nucleus of the spire consists of two white convex whorls. The two following are obliquely costate, the costæ being tuberculate above and below at the channelled suture, a third row of tubercles being round the middle; upon the next whorl the costæ die away, but the tubercles still remain above and below, forming a carination at both sutures. The rest of the whorls are smooth, with very oblique and fine lines of growth and the faintest appearance of spiral striation. They are prominently keeled above the suture, the keel being crenulated or finely subtuberculated. Above and close to this carina a prominent lira revolves up the last three volutions. Upon the body-whorl the angle is bordered below with one or two less prominent liræ. Of the three or four liræ surrounding the umbilical region, the inner one bordering the central callus is somewhat tuberculated.

Calliostoma tranquebaricum (Pfeiffer) appears to be the nearest ally of this species. It is, however, not so elevated or acutely conical, the base is flatter, the whorls are more

strongly striated, the keel is smooth, the apical whorls are differently sculptured, and the base of the shell is more strongly concentrically striated. The pale brown spots and dots, which characterize that species, are altogether absent in the present form. The localities of these species being in the same ocean and so close together, seems to suggest that they may be modifications of one and the same form.

Dentalium mirificum. (Pl. II. fig. 1.)

Testa parva, versus apicem valde curvata et acuminata, quadrate tubiformis, latere incurvato latiore quam exteriore, longitudinaliter tenuiter striata, lineis incrementi tenuissimis sculpta, inter angulos subconcaeva.

Longit. 19 millim., diam. max. $2\frac{1}{2}$.

Hab. Station 172, off Trincomalee, in 200–350 fathoms.

This little species is remarkable for the sharply curved end and the subquadrate form. The four angles are acute at the tip, but gradually become obtuse as the shell increases. The incurved side is the broadest of all, and up the middle of it, especially towards the apex, there is a raised striation more conspicuous than the rest. This is so prominent at the end that, when viewed with the opening towards the eye, five angles are visible. The two angles on the excurved side, which is the narrowest of all, become almost obsolete near the aperture.

The form of the aperture, owing to the greater width and flatness of the incurved side, is very like the letter **D**.

Siphodentalium quinquangulare, Forbes, is a much more slender species, and more circular in section near the aperture.

I have placed this species temporarily in *Dentalium*, as the tips of the four specimens examined are all damaged. Possibly more perfect examples may exhibit slits, as in *Siphodentalium*.

Venus juvenilis. (Pl. II. figs. 2, 2 a.)

Testa minima, inæquilateralis, postice subquadrata, antice angustior, rotundata, pallida, vel dilute fuscescens, liris radiantibus tenuissimis, lamellis concentricis numerosis supra liras subnodosis, minute cancellata; umbones antemediani, incurvati, erosi; lunula cordiformis, sulco circumdata; pagina interna alba, margine undique minutissime denticulato; cicatrices magnæ; sinus pallii haud profundus, triangularis.

Longit. 9 millim., alt. 8, diam. $5\frac{1}{2}$.

Hab. Station 162, Bay of Bengal, off Coromandel coast, in 142–400 fathoms.

Probably one of the smallest, if not actually the smallest, species in the genus. It has not the appearance of being immature. The crenulation of the valve-margins is very minute and extends all round excepting beneath the ligament.

Tellina parvula. (Pl. II. fig. 3.)

Testa parva, æquivalvis, inæquilateralis, tenuis, pellucido-albida, ovata, postice acuminata, mediocriter compressa, concentricè tenuiter striata, nitida, carina levi in utraque valva, ab umbone usque ad extremitatem posticam decurrente, instructa; valva dextra lunulata; umbones parvi, acuti, postmediani; margo dorsi anticus leviter declivis, vix arcuatus, posticus brevior, rectiusculus, magis obliquus, ventralis late arcuatus; latus anticum magnum, curvatum, posticum acuminatum; dentes cardinales et laterales normales; pagina interna nitida, obsolete radiatim substriata. Longit. 15 millim., alt. 11, diam. 5.

Hab. Station 166, lat. $13^{\circ} 34' 55''$ N., long. $80^{\circ} 32' 12''$ E., Bay of Bengal, off Coromandel coast, in 133 fathoms; Station 176, lat. $13^{\circ} 01' 06''$ N., long. $80^{\circ} 36' 56''$ E., off Coromandel coast, in 107 fathoms.

The narrow lunule is nearly all in the right valve, and is bordered by a distinct keel.

Abra maxima (Sowerby).

Abra maxima, Smith, Ann. & Mag. Nat. Hist. 1894, vol. xiv. p. 169.

Hab. Station 112, lat. $13^{\circ} 47' 30''$ N., long. $92^{\circ} 36'$ E., west of Andaman Islands, in 561 fathoms.

This species has now been dredged at four different stations in the Bay of Bengal, at depths varying from 128 to 677 fathoms.

Abra convexior. (Pl. II. figs. 4, 4 a.)

Testa *A. maximæ* simillima, sed minor et convexior, posticè vix carinata, umbonibus prominentioribus.

Longit. 18 millim., alt. $11\frac{2}{3}$, diam. 7.

Hab. Station 172, off Trincomalee, in 200–350 fathoms.

A. maxima, Sow., *A. convexior*, and *A. philippinensis*, Smith, are very closely allied. The first is much larger than the present species, not quite so triangular, less convex, and has more distinct carinations from the beaks behind. To show the difference in the convexity, I may state that a specimen of *A. maxima* 23 millim. long is only 6 in diameter, whereas an example of *A. convexior* only 18 in length has a thickness of $6\frac{2}{3}$.

A. philippinarum is more pointed behind, not so triangular, the umbones being less prominent, and the dorsal margins are less oblique than in the present species. The hinge, ligament-pit, muscular scars, and the inner surface of the valves are similar in both. In all three forms the umbo in the left valve is the slightest, more prominent than that of the right.

Poromya (Cetoconcha) tornata, Jeffreys.

Pecchiolia tornata, Jeffreys, Ann. & Mag. Nat. Hist. 1876, vol. xviii. p. 494.

Verticordia tornata, Smith, Lamellibranchiata 'Challenger' Exped. p. 170, pl. xxv. figs. 9-9b; Pelsener, Anatomy Deep-sea Mollusca 'Challenger' Exped. p. 20.

Hab. Station 110, lat. 9° 34' N., long. 85° 43' 15' E., east of Ceylon, in 1997 fathoms.

Beyond a very slight difference in form there is nothing to separate the single specimen from the above locality from this species, hitherto only known from great depths (1850 fathoms) in the Atlantic. It differs from the two specimens obtained by the 'Challenger' in being very slightly longer, or, in other words, the ends have a faintly produced appearance. But the two Atlantic shells are not exactly similar in form, a character which is liable to variation in every species. The sculpture and hinge-characters are exactly the same in all. To show how slight is the difference in the relative proportions of the Atlantic and Indian-Ocean specimens, I append the following measurements:—

	Length. millim.	Height. millim.	Diam. millim.
Atlantic specimen	13½	13½	10
Indian-Ocean specimen . .	14½	13½	10½

Pelsener has shown that this species is anatomically the same as *Poromya*, not *Verticordia*.

Solenomya patagonica, Smith.

Solenomya patagonica, Smith, Lamellibranch. 'Challenger' Exped. p. 208, pl. xi. figs. 1, 1a.

Hab. Off west coast of Patagonia, in 245 fathoms ('Challenger'); Station 151, off Colombo, in 142-400 fathoms ('Investigator').

The single Indian-Ocean specimen is a little smaller than the type, and was dredged alive. The valves do not exhibit the thickening within, beneath the hinge-line, referred to in

the description of the type; but this is probably due to age. The form of the valves, the muscular scars, and the radiately ridged and grooved character of the epidermis are similar in both examples. The fringed character of the latter, as described, was due to splitting when dry. In the present shell it is entire along the edge and curls over within the valves, being plicate and puckered at the anterior end. The valves are connected along the entire hinge-line by the epidermis, and the ligament is black, posterior to the beaks, and has no extension within the valves.

Cuspidaria macrorhynchus. (Pl. II. figs. 5, 5 a.)

Testa tenuis, alba, haud nitida, subglobosa, postice longissime et anguste rostrata, lineis incrementi tenuibus sculpta; rostrum rectum, carina obliqua debile dimidiatum, ad extremitatem curvate truncatum; umbones involuti, contigui; valva dextra dente unico laterali tenui instructa; sinistra edentula; locus ligamenti minimus, obliquus, postice declivis, infra umbonis apicem situs; pagina interna lactea.

Longit. 22 millim., alt. 9, diam. 8.

Hab. Station 177, lat. 13° 47' 49" N., long. 73° 7' E., off west coast of India, in 636 fathoms.

In certain lights, in addition to the lines of growth, very faint traces of radiating sculpture are observable.

Cuspidaria Wollastonii, Smith, from the Atlantic, resembles this species in the general outline of the body of the shell; but its rostrum is shorter and broader, and is bisected by a sharper keel. On comparison of the left valves (only one valve of *C. Wollastonii* is known) slight differences in the ligament-pit and the dorsal margin are observable.

Lucina spinifera (Montagu).

Lucina spinifera, Forbes and Hanley, Brit. Moll. vol. ii. p. 49, pl. xxxv. fig. 1; Jeffreys, Brit. Conch. vol. ii. p. 240, vol. v. pl. xxxii. figs. 6, 6 a; Reeve, Conch. Icon. pl. vii. fig. 39.

Hab. Station 172, off Trincomalee, Ceylon, in 200-350 fathoms.

Three specimens from the above locality I am unable to separate from this European species. The form in northern specimens is more or less variable, and the same variation occurs in the Indian-Ocean examples. The concentric lamellæ are stronger near the umbones and rather more distant, and the posterior dorsal margin is straighter than

usual. The hinge and the muscular impressions are precisely similar. Mr. Brazier has just recorded *Cryptodon flexuosus*, another British species, from New South Wales and Tasmania, and it is gratifying to strengthen his statement by recording the occurrence of another species from our coasts in tropical seas.

Cryptodon investigatoris. (Pl. II. figs. 6, 6 a.)

Testa oblonga, subquadrata, valde inæquilateralis, antice concave truncata, alba, æquivalvis; valva dextra crassiuscula, concentrice tenuiter striata, antice profunde lunulata, carina mediocriter acuta ab umbone ad latus posticum decurrente instructa, inter carinam et marginem dorsalem valde excavata, infra carinam leviter depressa, carina secunda acuta, margini dorsi subparallela instructa; umbo terminalis, antice curvatus, acutiusculus; margo dorsi postice tenuis, acutus, parum arcuatus, versus umbonem pro ligamento anguste sulcatus, posticus superne sinuatus, in medio ad finem carinæ inferioris prominens, infra levissime sinuatus, deinde curvatus; margo inferior rectiusculus, dorsali subparallelus, antice subincurvatus; lunula profunda, carina obtusa marginata; pagina interna antice et versus lineam pallii radiatim striata; cicatrix posterior parva, sub extremitate marginis dorsalis sita, antica indistincta; linea pallii simplex; carinæ externæ intus sulcis subprofundis indicatæ.

Longit. 38 millim., alt. 27, diam. 26.

Hab. Station 151, off Colombo, Ceylon, in 142–400 fathoms.

Only two right valves of this species were obtained; but, judging from the even level of the margin and the position of the pallial line, there is little doubt but that this shell is equivalve. The deep groove from the umbo to the posterior end of the valve is much deeper than in the type of the genus, *Cryptodon flexuosus*, and the keel which limits it beneath is very acute, but not so acute as the carina which marks off the area between it and the dorsal line.

Cryptodon philippinarum (Hanley).

Lucina philippinarum, Hanley, Cat. Biv. Shells, p. 348, pl. xiv. fig. 18; Reeve, Conch. Icon. pl. iv. figs. 18 a, b.

Lucina (Anodontia) philippinarum, Martens, Journ. Linn. Soc. Lond. 1887, vol. xxi. p. 174.

Austriella sordida, Tenison-Woods, Trans. R. Soc. Vict. 1881, vol. xvii. p. 83, pl. (unnumbered) figs. 10, 11.

Lucina induta, Stoliczka, Martens, *op. cit.* p. 174.

Hab. Philippines and Mergui (Hanley); Manila and

Singapore (*Reeve*); Mergui Archipelago (*Martens*); Port Denison, Queensland (*Tenison-Woods*); Port Canning, Bengal (*H. F. Blanford*, in *Brit. Mus.*); Station 172, off Trincomalee, in 200–350 fathoms (*'Investigator'*).

Only two or three young specimens, $\frac{3}{4}$ inch long, were obtained at the above station. At this age they are very flat, being not more than 6 millim. in diameter.

Cryptodon acuticarinatus. (Pl. II. figs. 7, 7 a.)

Testa inæquilateralis, æquivalvis, mediocriter ventricosa, tenuis, alba, prope marginem externam epidermide tenui lutescente induta, concentricè tenuiter striata; valvæ tenues, postice acute bicarinatæ, inter carinas profunde sulcatæ; margo dorsi utrinque declivis, anterior longior, vix arcuatus; latus anticum rotundatum, posticum sinuatum; margo inferior late curvatus; umbones subacuti, antice versi, pone medium siti; lunula elongato-cordata, haud profunda, area dorsalis postica angusta, utrinque acuminata, carinis acutis marginata; pagina interna alba, radiatim substriata; cicatrices et linea pallii indistinctæ.

Longit. 17 millim., alt. 14, diam. $10\frac{1}{2}$.

Hab. Station 173, lat. $8^{\circ} 35' 45''$ N., long. $81^{\circ} 17' 43''$ E.; off Trincomalee, Ceylon, in 609 fathoms.

In addition to the feeble depression which defines the lunule, there is in each valve a second faint impression curving from the umbo to the anterior end. Viewed from behind the shell has a very acutely carinate and deeply sulcate appearance.

Modiola Watsoni, Smith.

Modiola Watsoni, Smith, Lamellibranchiata 'Challenger' Exp. p. 275, pl. xvi. figs. 5–5 c.

Modiola, sp., Wood-Mason and Alcock, Ann. & Mag. Nat. Hist. 1891, vol. vii. p. 19.

Hab. Off Luzon, Philippines, in 700 fathoms, and near Arrou Islands, in 800 fathoms (*'Challenger'*); Station 144, lat. $15^{\circ} 5' 6''$ N., long. $72^{\circ} 48' 10''$ E., in 172 fathoms; Station 133, lat. $15^{\circ} 43' 30''$ N., long. $81^{\circ} 19' 30''$ E., in 678 fathoms.

Messrs. Wood-Mason and Alcock remark that this species is "an almost characteristic inhabitant of the mud of the Bay of Bengal, as at present explored, in and near 100 fathoms." "The byssus is a large bunch of fine silky threads saturated with fine mud usually. Met with in beds in thick mud in 89 to 93 fathoms, and on sand in 98 to 102 fathoms."

Some of the Indian-Ocean specimens are of a darker greyer

colour than the specimens obtained by the 'Challenger,' and the valves are also deeper in proportion to the length. The largest specimen is 30 millim. long and $12\frac{1}{2}$ in diameter, whereas the finest 'Challenger' example is 43 by $13\frac{1}{2}$. "The rust-like incrustation adhering to the anterior or umbonal region" noticed in the type is also present in all the Indian-Ocean specimens.

Limopsis indica, Smith.

Limopsis indica, Smith, Ann. & Mag. Nat. Hist. 1894, vol. xiv. p. 171, pl. v. fig. 7.

Hab. Immediately off Minnikoy Island, Maldive group, in 1200 fathoms.

The specimens from the above depth are quite free from the "rust-red earthy deposit" which more or less coated the typical examples.

Nucula donaciformis. (Pl. II. fig. 8.)

Testa triangularis, solidiuscula, valde inæquilateralis, antice oblique truncata, ad extremitatem subangulata, postice acuminata rotundata, sub epidermide olivacea, albida, vel plus minus livida, liris tenuibus arcuatis dorsum versus utrinque obsolete, instructa, lineis incrementi decussata; area anto umbones sublunulata, in medio prominens, impressione haud profunda circumscripta, fere lævis; area postica vix sculpta, haud limitata, in medio anguste excavata; margo dorsi anticus rectiusculus, valde descendens, posticus longior, leviter arcuatus; margo ventris late curvatus; umbones incurvati, antice versi; pagina interna albo-margaritacea, radiatim obsolete striata, margine inferiore pulcherrime denticulato; dentes anteriores cardinis circiter 11, posteriores 18-20; fossa ligamenti parva, obliqua.

Longit. 15 millim., alt. 11, diam. $7\frac{1}{2}$.

Hab. Station 162, lat. $13^{\circ} 51' 12''$ N., long. $80^{\circ} 28' 12''$ E.; Bay of Bengal, in 145-250 fathoms.

The form of this species is very triangular, and the ventral margin is unusually straight. It somewhat recalls *N. sulcata*, Brown, but it is more angular anteriorly, the radiating lines are fewer, and the concentric sculpture finer. The denticulation within the ventral edge of the valves is also coarser than in the British species.

Nucula bengalensis. (Pl. II. fig. 9.)

Testa acuminata ovata, valde inæquilateralis, tenuis, epidermide polita olivacea induta, lineis incrementi tenuibus, striisque tenuis-

simis radiantibus obsoletis sculpta; margo dorsi anticus valde descendens, subarcuatus, posticus longior, magis curvatus, ventralis late arcuatus; area dorsalis antica in medio prominens et carinata, prope umbones lunulam parvam exhibens; area postica in medio anguste sulcata, sulco fusiforme utrinque acute marginato; umbones incurvati, circiter in $\frac{1}{4}$ longitudinis collocati; pagina interna iridescens, margaritacea, radiatim minutissime substriata; dentes cardinis anteriores circiter octo, posteriores circa viginti; fossa ligamenti angusta, obliqua, postice declivis. Longit. 17 millim., alt. 12, diam. $7\frac{1}{2}$.

Hab. Station 162, lat. $13^{\circ} 51' 12''$ N., long. $80^{\circ} 28' 12''$ E., off Coromandel coast, in 145–250 fathoms.

N. Strangei, A. Adams, from New Zealand, is very like this species in general form; but a careful comparison reveals certain differences. It is smaller and more solid, the anterior area has not the peculiar central keel-like prominence, and the posterior side lacks the narrow fusiform escutcheon observable in the present species. The hinge-plate is stronger, the teeth fewer, and the ligament-pit less oblique, &c.

Nuculana fumosa. (Pl. II. figs. 10, 10 a.)

Testa parva, subtriangularis, postice breviter rostrata, inæquilateralis, epidermide polita fumose olivacea induta, incrementi lineis leviter striata; margo dorsi anticus obliquus, levissime excurvatus, posticus æque declivis, longior, paulo concavus; margo ventralis late arcuatus; latus anticum acute rotundatum, posticum obtuse nasutum; area dorsalis anterior vix lunulata, haud circumscripta, posterior in medio excavata, concavitate carina obtusa circumdata; linea cardinis crassiuscula, dentibus anticis ad 14 posticisque circiter 17 instructa; fossa ligamenti minuta; pagina interna cæruleo-grisea.

Longit. 7 millim., alt. 4, diam. $3\frac{1}{2}$.

Hab. Station 162, Bay of Bengal, off Coromandel coast, 145–250 fathoms.

This species somewhat recalls the *Portlandia pygmaea* of Norway and Greenland, but is more pointed behind, and covered with a darker epidermis; the posterior dorsal area is more excavated, the escutcheon being lanceolate and bounded by a distinct ridge on each side.

Nuculana indica. (Pl. II. figs. 11, 11 a.)

Testa triangulariter ovata, postice acuminata, rostrata, antice acute rotundata, paulo inæquilateralis, epidermide flavescenti-viridi induta, sublævis, sed supra medium valvarum plicis paucis concentricis utrinque obsoletis instructa, striisque incrementi sculpta;

margo dorsi anticus vix arcuatus, leviter declivis, posticus longior, subconcaevus, æqualiter descendens, ventralis late curvatus; area dorsalis utrinque anguste excavata, area postica distinctius marginata quam antica; umbones concentricè fortiter striati, antemediani; pagina interna albida; dentes posteriores 20, anteriores circiter 18; sinus pallii latus, mediocriter profundus.

Longit. 12 millim., alt. $7\frac{1}{2}$, diam. 6.

Hab. Station 162, Bay of Bengal, off Coromandel coast, 145–250 fathoms.

The transverse plicæ on the central part of the valves, which become obsolete on each side, are very fine and only just visible to the naked eye. Like *Nuculana lugubris*, A. Adams, this species has no internal cartilage, the ligament being placed on the hinge-line, beneath and on each side of the umbones.

Malletia conspicua. (Pl. II. fig. 12.)

Testa inæquilateralis, transversim oblonga, mediocriter convexa, subtenuis, antice angustata, postice latior, concentricè tenuiter striata, epidermide tenui, nitida, dilute olivacea induta; area dorsalis utrinque umbones linearis, excavata, carinis marginata; margo dorsi anticus brevis, rectus, leviter obliquus, posticus fere horizontalis, duplo longior; margo ventralis late arcuatus, utrinque curvate adscendens; umbones paulo prominentes, approximati, in $\frac{1}{3}$ longitudinis siti; linea cardinis mediocriter tenuis, dentibus acutis anterioribus circiter 18 et posticis 30 instructa; pagina interna nitens, albida, lineam pallii late sed haud profunde sinuatam exhibens; ligamentum parvum, convexum, prominens, olivaceo-fuscum.

Longit. $21\frac{1}{2}$ millim., alt. 13, diam. 8.

Hab. Station 177, lat. $13^{\circ} 47' 49''$ N., long. $73^{\circ} 7'$ E., depth 636 fathoms (Arabian Sea, off west coast of India).

The valves are very thin and sharp at the ventral and lateral margins, and become somewhat thicker and stronger towards the umbones. The difficulty of closing the parted valves makes it impossible to say to what extent this species may gape at the ends; but, so far as I am able to judge, the valves would not quite close either in front or behind. The striæ upon the greater part of the surface are strong and regular, but posteriorly as they curve up to the dorsal margin they become weaker, so that this part of the valves has a slightly smoother appearance.

M. arrouana, Smith, is an allied species, but of a somewhat different form, with less regular and not such close concentric striæ.

M. angulata, Sowerby *, another Indian-Ocean species, is well distinguished from the present form by its different and remarkable shape. It was dredged in the Bay of Bengal at a depth of 200 fathoms.

Amussium caducum, Smith.

Amussium caducum, Smith, Ann. & Mag. Nat. Hist. 1894, vol. xiv. p. 173.

Hab. Station 135, lat. 15° 29' N., long. 72° 41' E.; off Goa, west coast of India, in 559 fathoms.

This species has now been obtained on both sides of the Indian peninsula, and also in the China Sea, at depths ranging from 410 to 700 fathoms.

Lima (Limatula) subtilis. (Pl. II. figs. 13, 13 a.)

Testa æquivalvis, convexa, tenuissima, ovata, inferne lateraliter subacuminata, pellucido-albida, liris tenuissimis radiantibus circiter 24, medianis lateralibus confertioribus, lineisque incrementi supra liras minute squamosis subcancellata; umbones acuminati, subapproximati; linea cardinis tenuis; area ligamenti fusiformis, angusta; pagina interna radiatim sulcata, sulcis liris externis convenientibus; margines valvarum ad extremitates lirarum minute dentati.

Alt. 10 millim., longit. 6, diam. 5½.

Hab. Station 176, lat. 11° 47' 6" N., long. 73° 57' 30" E.; off Malabar coast, in 1070 fathoms.

This species, of which only a single specimen was obtained, is extremely thin, and has an oblique appearance, on account of the most prominent acute ventral curve being somewhat lateral. It is more or less coated with a thin rust-red earthy deposit.

EXPLANATION OF THE PLATES.

PLATE I.

- Fig. 1. Pontiothauma mirabile.*
Fig. 2. — abyssicola.
Fig. 3. Pleurotoma vagata.
Fig. 4. — præsignis.
Figs. 5, 5 a. Drillia fugata.
Fig. 6. Nassa turrifera.
Fig. 7. Columbella (Mitrellu) Pacei.
Fig. 8. Natica albospira.
Fig. 9. — candidula.

* Proc. Zool. Soc. 1888, p. 208, pl. xi. fig. 15.

- Fig. 10. *Sigaretus parvus*.
 Fig. 11. *Bathybembix Wood-Masoni*.
 Fig. 12. *Calliostoma sublaeve*.

PLATE II.

- Fig. 1. *Dentalium mirificum*.
 Figs. 2, 2 a. *Venus juvenilis*.
 Fig. 3. *Tellina parvula*.
 Figs. 4, 4 a. *Abra convexior*.
 Figs. 5, 5 a. *Cuspidaria macrorhynchus*.
 Figs. 6, 6 a. *Cryptodon investigatoris*.
 Figs. 7, 7 a. — *acuticarinatus*.
 Fig. 8. *Nucula donaciformis*.
 Fig. 9. — *bengalensis*.
 Figs. 10, 10 a. *Nuculana fumosa*.
 Figs. 11, 11 a. — *indica*.
 Fig. 12. *Malletia conspicua*.
 Figs. 13, 13 a. *Lima (Limatula) subtilis*.

II.—Some new Species of Odonata of the "Légion" Lestes,
 with Notes. By ROBERT M'LACHLAN, F.R.S.

MOST of the species described in this paper have been in my collection for years, and form a small portion of the undetermined materials in the "légion" that I possess.

ORTHOLESTES, Calvert.

This genus was originally described by Mr. P. P. Calvert (who is doing most excellent work in American Odonata) in the Ent. News, vol. ii. p. 199 (1891), to receive an insect from Jamaica which he termed *O. clara*. In the Proc. Acad. Nat. Sci. Philad. for 1893, pp. 377-383, he amplified the original description for both genus and species, and added a second species from Haiti, which he termed *O. Abbotti*, the two being evidently much allied, and the latter known by only one male.

I have long had many males and four females of an *Ortholestes* from "Samana Bay, S. Domingo." According to the locality these should be *O. Abbotti*, but they agree better with the description of *O. clara*, only the "more apical" tooth of the superior appendages, instead of being "slightly notched," is distinctly bifid (but not deeply so), the upper portion usually slightly longer and distinctly more slender than the lower. Of *O. Abbotti* it is written that "the more apical tooth is transformed into a slender acute curved spine." I think that insects of the same lot from Samana Bay received by